Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

THE PHYSIOLOGY OF THE HEART is enriched by a very methodic paper, by Ludwig and Luchsinger, in *Pflüger's Archiv* (vol. 25, p. 211). They began by studying the influence of temperature upon the heart. Contrary to the experience of some previous observers in mammals, they found that in the frog decided lowering of the temperature destroyed the action of the vagus nerve, while extreme warmth increased its irritability. Since the temperature is known to influence also the motor ganglia of the heart, the authors propose the following view : The effect of stimulation of the vagus depends not only upon the irritability of that nerve, but also inversely upon the excitability of the motor ganglia. Vigorous activity of the latter is less easily inhibited than feeble action. Cold enfeebles both vagus and motor ganglia, but the former most. As the temperature increases beyond a mean, the irritability of the motor ganglia rises above that of the inhibitory apparatus, hence the weak action of the vagus observed by previous authors under these circumstances. But as the temperature approaches the limit compatible with life the motor ganglia fail first, hence the superiority of the inhibitory fibres. In fact, this same increase of vagus action just prior to failure of the heart, can be witnessed in natural death as well as in various forms of narcotic poisoning.

Further experiments were made on the bloodless heart. Blood was expelled by a current of normal salt solution or neutral almond oil. After some minutes or hours, sooner with oil than with salt water, the pulsations cease in the ventricle, auricle, and, lastly, venous sinus.

Blood or serum restores the irritability at once.

In these experiments the effect of vagus irritation persisted as long as the heart continued to beat; the feebler even the pulsation the more easily could it be checked by vagus stimulation.

The effect of the intracardiac pressure upon the rhythm was studied by sending a current of salt solution through the bloodless heart under variable pressure. It was found without exception that the frequency rose with the pressure at first in a direct proportion, subsequently more slowly.

The same dependence of the activity on the tension was even more strikingly illustrated on the lower half of the ventricle, which contained no nerve cells. Ordinarily quiescent, when filled with a salt solution the apex will beat only when the pressure is increased, and the frequency will rise with the tension. The greater the stimulation of the motor ganglia by the augmented tension the less manifest is the action of the vagus when irritated, because in the struggle between inhibitory and motor ganglia the more active side must win. If in such experiments the auricle yields more readily to the influence of the vagus than the ventricle, it is due to the fact that the thinner auricular musculature is nearly overcome by the greater work imposed upon it by the high pressure, which the thicker ventricular walls can yet accomplish. Occasionally some anomalous results were observed; for instance, a relative insufficiency of the vagus even after the pressure had been reduced. This is referred to a long persistence of the stimulant effect of the previous pressure upon the motor ganglia, and not to paralysis of the vagus. For in other instances the vagus regained its superiority after a pressure equal to 40 cm. of water had distended the heart for some time. The authors explain this by failure of the motor ganglia from over-stimulation. Occasionally they even saw an accelerating influence of the vagus upon a heart in a state of contracture, for which they give a somewhat forced explanation.

The experiments of Merunowicz have shown that the apex of the heart is capable of pulsating under the influence of some irrigating fluids like defibrinated blood. This is not due to the tension alone, for the beats continue even at a pressure of zero. The action of different fluids was examined in this respect. First of all the temperature was investigated and, as was anticipated, it was found that with increasing temperature the apex became more irritable.

The author's experiments with different irrigating fluids seem hardly numerous or varied enough, but, on the whole, confirm the conclusion previously arrived at by Merunowicz, that the higher percentage of blood in the irrigating fluid increases the irritability of the muscle, while a lower proportion favors the muscular discharges.

THE FUNCTIONS OF THE CEREBRAL CORTEX.—We translate the following abstract by Sigmund Exner of J. Munk's recent memoir on the functions of the brain, from the *Biologische Centralblatt*, No. 1, April 15, of this year.

The book before us contains six lectures delivered from 1877 to 1880 before the Physiological Society and one before the Academy of Sciences, of Berlin. The earliest publication is a historical introduction, together with a series of critical remarks, with also important suggestions for the experimenter. It may be well to use this opportunity to give a comprehensive abstract of the author's experimental results, although they do not altogether belong to the most recent times.

In opposition to the view of Gall, chiefly by reason of the experiments of Flourens and Longet, the idea of the unity of the cortex of the brain as the organ of the mental functions had become established with physiologists. Nevertheless, clinical observation had afforded the proof that certain mental activities were associated with the integrity of limited localities of the brain (speech centre), and anatomical investigations had rendered it probable that sensory and motor functions were associated with different portions of the cerebrum. Fritsch and Hitzig showed in 1870 that electric excitation of limited tracts of the cortex produced movements in definite muscular groups on the opposite side of the body, and that definite muscle groups belonged functionally to definite regions of the cortex. For the purpose of demonstrating localized centres for the separate sensory functions, Munk has the especial credit of having made numerous and careful investigations in dogs and monkeys.

In the dog the larger portion of the occipital lobe has the function of a "visual sphere"; that is, in it occur the central changes on which the function of sight depends. It is the ultimate distinction of the optic fibres, according to the following arrangement. The greater part of the left retina is in connection with the right visual sphere; only the most lateral portion, not over a quarter of the whole retina, measured horizontally, is in connection with the visual sphere of the same side. That of the right eye is correspondingly connected with the left side of the brain. The distribution of the fibres is so arranged that the ret-